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Mars Telecommunication Orbiter Mission Operations Concepts

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The Mars Telecom Orbiter (MTO), to be launched in 2009, is a NASA project funded by the Mars Exploration Program. The MTO relay capability will enable next decadal missions at Mars collecting gigabits of data a day to be relayed back at speeds exceeding 4 Mbps and it will enable small missions whose limited resources do not permit them to have a direct link to Earth. Specifically, MTO will perform telecommunication relay functions in support of the Mars Science Laboratory (MSL), Mars Scouts, NetLanders, and other NASA missions at Mars during the time frame between 2010 and 2016, with a possible four-year extension. In addition MTO will perform significant technology demonstrations for the Optical Communication Experiment and possibly the Mars Sample Rendezvous demonstration. As an option, MTO is also planning on carrying the CNES NetLanders for release at Mars. And finally, aeronomy science is being defined as an important possible scientific addition to the reference mission consisting of telecom relay and optical communication demonstrations.

This paper will address the tall tent pole operations concepts that drive the design and operation of MTO. The relay concept will explore a day in the life of MTO. The science concept will determine the aeronomy science drivers and their impact on operations. We shall address the steps required to execute the technology demonstrations, the commissioning of the flight system, and the critical events related to NetLander release and Entry Descent and Landing (EDL), Mars Orbit Insertion, and MSL EDL. We shall also start a Fault Tree Analysis and look into operations under fault conditions. And finally we shall cover the data flow and team architecture to manage the operations of the spacecraft, the payloads and the ground data system.

The individual operations concepts and the overall integrated mission scenario will help define the mission in a more realistic setting and help with the formulation of the mission requirements and interfaces, the design, the plans and the cost.